REMARKS

Applicant respectfully requests the Examiner's reconsideration of the present application, as amended.

Summary of Office Action

Claims 1-16 are pending.

Claim 13 was objected to due to informalities.

Claims 13-16 were rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 4,856,059 of Halbig ("Halbig").

Claims 1-8 were rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 5,881,130 of Zhang ("Zhang") in view of U.S. Patent No. 4,335,341 of Kaplan ("Kaplan").

Claims 9-12 are rejected under 35 U.S.C. § 103 as being unpatentable over Zhang, Kaplan, and U.S. Patent No. 5,488,631 of Gold ("Gold").

Summary of Amendments

Claims 1, 5, and 13 have been amended. Applicant submits support for the claim amendments is found in the specification, the figures and the claims as originally filed. Applicant respectfully submits the amendments to the claims do not add new matter.

Response to claim objections

Claim 13 was objected to due to informalities. In particular, the Examiner suggested that the term "sense inputs" be replaced with "sensed inputs". Applicant respectfully submits that such terminology implies the signal

processor rather than the subscriber line is being sensed. Although applicant believes that "sensing a tip line and a ring line" provides ample antecedent basis for subsequent use of the terms "sensed tip signal" and "sensed ring signal", Applicant has amended claim 13 to clearly introduce proper antecedent basis for "sensed tip signal" and "sensed ring signal".

Applicant respectfully submits the objections to claim 13 have been overcome.

Response to 35 U.S.C. § 102 rejections

Claims 13-16 were rejected as being anticipated by Halbig. Applicant respectfully submits that Halbig does not teach or suggest a signal processor having sensed inputs for sensing a tip line and a ring line of a subscriber loop. Applicant further submits Halbig does not teach or suggest *a sensed tip signal including first and second sampled tip voltages sampled from opposing sides of a tip fuse,* nor *a sensed ring signal including first and second sampled ring voltages sampled from opposing ends of the ring fuse.*

The Examiner has identified element 26 of Halbig as a signal processor having sensed inputs for sensing a tip line and a ring line of a subscriber loop. Applicant traverses the Examiner's characterization of Halbig. Microprocessor 26 functions to disconnect and reconnect the subscriber loop from the subscriber line interface circuit 16 in response to the output of a temperature responseive sensor T. (Halbig, col. 4, lines 28-37). Applicant finds no support for the Examiner's assertion that microprocessor 26 senses either the tip or the ring line.

The sense input to the microprocessor is the output of a temperature sensor, not the ring line or the tip line.

Applicant disagrees with the Examiner's assertion that resistors Rf1 or Rf2 are used as fuses. The cited portion of Halbig indicates that *conventional* subscriber interfaces insert fusible components into the RING and TIP lines to interrupt the circuit in the event of an overcurrent condition (Halbig, col. 6, lines 4-9). Halbig's microprocessor 26 disconnects the subscriber loop in the event of an overcurrent condition thus obviating the service and repair requirement associated with fusing. (Halbig, col. 6, lines 4-16; lines 43- 56).

Even if one accepted the Examiner's assertions *arguendo* (i.e., that Rf1, Rf2 could be analogized to be ring and tip fuses, respectively), Halbig's microprocessor does not sense or sample ring voltages from opposing sides of Rf1. Similarly, Halbig does not sense or sample tip voltages from opposing sides of Rf2.

Applicant thus respectfully submits, Halbig does not teach or suggest *a sensed tip signal including first and second sampled tip voltages sampled from opposing sides of a tip fuse*, nor *a sensed ring signal including first and second sampled ring voltages sampled from opposing ends of the ring fuse.*

In contrast, claim 13 includes the language:

> 13. A subscriber loop interface circuit apparatus comprising:
> a signal processor having sense inputs for receiving a sensed tip signal and a sensed ring signal from a tip line and a ring line of a subscriber loop, the signal processor generating subscriber loop control signals; and
> a linefeed driver for driving the subscriber loop in accordance with the subscriber loop control signals, the linefeed driver including a tip fuse series-coupled to the tip line and a ring fuse series-coupled to the ring line, *wherein the sensed tip signal includes first and second sampled tip voltages*

sampled from opposing sides of the tip fuse, wherein the sensed ring signal includes first and second sampled ring voltages sampled from opposing ends of the ring fuse.

(Claim 13, as amended)(*emphasis added*)

Claims 15 similarly include the language:

15. A method comprising the steps of:
generating subscriber loop control signals in response to a sensed tip signal and a sensed ring signal of a subscriber loop, *wherein the tip signal is sensed before and after a tip fuse, wherein the ring signal is sensed before and after a ring fuse;* and
driving the subscriber loop in accordance with the subscriber loop control signals.

(Claim 15)(*emphasis added*)

Applicant respectfully submits that Halbig does not teach or suggest sensing each of the tip and ring lines at two locations to determine both a status of each fuse and a power dissipation of each linefeed driver component.

In contrast, claim 16 includes the language:

16. A subscriber loop interface circuit apparatus comprising:
a signal processor having sense inputs for sensing a tip line and a ring line of a subscriber loop, the signal processor generating subscriber loop control signals; and
a linefeed driver for driving the subscriber loop in accordance with the subscriber loop control signals, the linefeed driver including a tip fuse series-coupled to the tip line and a ring fuse series-coupled to the ring line, *wherein the tip line and ring line are each sensed at two locations to determine both a status of each fuse and a power dissipation of each linefeed driver component.*

(Claim 16)(*emphasis added*)

Thus claims 13, 15, and 16 are not anticipated by Halbig. Given that claim 14 depends from claim 13, claim 14 is likewise not anticipated by Halbig.

Applicant respectfully submits the rejections under 35 U.S.C. § 102 have been overcome.

Response to 35 U.S.C. § 103 rejections

Claim 1-8 were rejected as being unpatentable over Zhang and Kaplan. Claims 9-12 were rejected as being unpatentable over Zhang, Kaplan, and Gold.

With respect to claims 1-12, applicant respectfully submits *none of the cited references, alone or combined, teaches or suggests 1) estimating an instantaneous power dissipation of the linefeed component using the sampled line voltage and line current from one of a tip and a ring line of a subscriber loop; and 2) filtering the estimated instantaneous power dissipation to generate an estimated junction temperature of the linefeed component.*

In order to sustain a rejection under 35 U.S.C. § 103, three criteria must be met:

> *First*, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. *Second*, there must be a reasonable expectation of success. *Finally*, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure
> (*In re Vaeck*, 20 USPQ2d 1438 (Fed. Cir. 1991)(*emphasis added*)

Applicant respectfully submits that there is no suggestion or motivation to combine the references and that the combination of references still does not teach all the claim limitations.

Zhang includes a disclosure of methods and apparatus for determining the presence of load coils attached to a telephone line. A stimulus waveform comprised of the sum of samples of sine waves of various frequencies is applied to the telephone line. The current and voltage of the line are sampled and a

Fourier transform is performed to enable computing auto and cross power spectra of the current and voltage. The power spectra are used to compute the line impedance as a function of frequency. Peaks or sign changes in the line impedance are indicative of the presence of one or more load coils. (Zhang, col. 2, lines 29-46; col. 7, lines 18-37; col. 8, lines 53-67).

Applicant submits Zhang teaches away from calculating an instantaneous power. (The power spectrum is a frequency domain expression that is not equivalent to instantaneous power dissipation a time domain expression) Applicant notes that Zhang is concerned with detecting the presence and possibly the number of load coils that may be present on the subscriber line. Zhang is thus not concerned with determining instantaneous power dissipation or junction temperatures of linefeed components.

The Examiner appears to be citing Zhang merely for the storing of sampled current and voltage signals for later processing.

Kaplan discloses a power protection circuit. Contrary to the Examiner's assertions, Kaplan does not teach or disclose determining a semiconductor junction temperature.

The temperature discussion cited by the Examiner merely acknowledges that the voltage across a semiconductor junction is temperature sensitive as a precaution to the practitioner. *Kaplan cautions the practitioner to maintain semiconductor junctions of transistors Q11, Q12, Q2 and Q14 at substantially the same temperature* to avoid the undesired effect of temperature variation between these components. (Kaplan, col. 4, lines 60- col. 5, line 2). This is not equivalent to determining the temperature of the junctions. *Kaplan does not teach determining*

the temperature as alleged by the Examiner. Applicant submits that the Examiner's alleged suggestion or motivation has no support and appears to be an impermissible use of hindsight.

Even if Kaplan arguably teaches estimation of an instantaneous power dissipation, *such calculation is not based on a sampled line voltage or line current from one of a tip and a ring line of a subscriber loop*

Even if there were a suggestion or motivation to combine, Applicant is uncertain as to how the Examiner proposes combining Kaplan (an analog circuit with analog signals) with Zhang (stored values in digital form) to result in a teaching of calculating instantaneous power dissipation or calculated junction temperature. Is the circuit of Kaplan added to the microprocessor of Zhang? If so, please indicate how it operates with the stored values to teach calculation or estimation of instantaneous power dissipation as alleged by the Examiner.

Thus applicant submits that none of the references alone or combined teaches or suggests: *1) estimating an instantaneous power dissipation of the linefeed component using the sampled line voltage and line current from one of a tip and a ring line of a subscriber loop; and 2) filtering the estimated instantaneous power dissipation to generate an estimated junction temperature of the linefeed component.*

In contrast, claim 1 includes the language:

> 1. A method comprising the steps of:
> a) *sampling at least one of a tip and a ring signal to determine a line voltage and a line current of a linefeed component of a subscriber loop;*
> b) *estimating an instantaneous power dissipation of the linefeed component using the sampled line voltage and sampled line current;* and
> c) *filtering the estimated instantaneous power dissipation to generate an estimated junction temperature of the linefeed component.*

(Claim 1, as amended)(*emphasis added*)

Similar arguments may be made with respect to claims 5 and 7 which include the language:

> 5. A method comprising the steps of:
> a) selecting a selected linefeed component of a plurality of linefeed components coupled to a subscriber loop having a tip signal and ring signal;
> b) *sampling at least one of the tip and the ring signals to determine a voltage and a current associated with the selected linefeed component;*
> c) *estimating an instantaneous power dissipation of the selected linefeed component using the associated voltage and current;* and
> d) *filtering the estimated instantaneous power dissipation to generate an estimated junction temperature of the selected linefeed component.*

(Claim 5, as amended)(*emphasis added*)

> 7. A subscriber loop signal processor apparatus, comprising:
> an analog-to-digital converter (ADC) for sampling at least one of a tip and a ring signal;
> *a power calculator coupled to calculate an instantaneous power dissipation of a selected linefeed driver component from the sampled signal and control currents* provided to a plurality of linefeed driver components; and
> *a filter providing an estimated junction temperature of the selected linefeed driver component from the instantaneous power dissipation.*

(Claim 7)(*emphasis added*)

Thus applicant respectfully submits claims 1, 5, and 7 are patentable under 35 U.S.C. § 103 in view of the cited references.

With respect to claims 9-12, applicant submits that *none of the references alone or combined teaches or suggests 1) a linefeed driver including a tip fuse series-coupled to the tip line and a ring fuse series-coupled to the ring line, or 2)* that the sensed tip signal *includes first and second sampled tip voltages sampled from opposing sides of the tip fuse, wherein the sensed ring signal includes first and second sampled ring voltages sampled from opposing ends of the ring fuse.*

To the contrary, none of the cited references teach or suggest tip/ring series-coupled fuses or sampling the sensed tip and ring signals on both sides of any fuse.

In contrast claims 13 and 16 include the language:

> 13. A subscriber loop interface circuit apparatus comprising:
> a signal processor having sense inputs for receiving a sensed tip signal and a sensed ring signal from a tip line and a ring line of a subscriber loop, the signal processor generating subscriber loop control signals; and
> a linefeed driver for driving the subscriber loop in accordance with the subscriber loop control signals, *the linefeed driver including a tip fuse series-coupled to the tip line and a ring fuse series-coupled to the ring line, wherein the sensed tip signal includes first and second sampled tip voltages sampled from opposing sides of the tip fuse, wherein the sensed ring signal includes first and second sampled ring voltages sampled from opposing ends of the ring fuse.*

(Claim 13, as amended)(*emphasis added*)

> 16. A subscriber loop interface circuit apparatus comprising:
> a signal processor having sense inputs for sensing a tip line and a ring line of a subscriber loop, the signal processor generating subscriber loop control signals; and
> a linefeed driver for driving the subscriber loop in accordance with the subscriber loop control signals, *the linefeed driver including a tip fuse series-coupled to the tip line and a ring fuse series-coupled to the ring line,* wherein the tip line and ring line are each sensed at two locations to determine both a status of each fuse and a power dissipation of each linefeed driver component.

(Claim 16)(*emphasis added*)

Thus applicant respectfully submits claims 13 and 16 are patentable under 35 U.S.C. § 103 in view of the cited references.

As stated above, claims 1, 5, 7, 13, 15, and 16 are patentable under 35 U.S.C. § 103 in view of the cited references. Given that claims 2-4 depend from claim 1; claim 6 depends from claim 5; claims 8-12 depend from claim 7; and

claim 14 depends from claim 13, applicant submits claims 2-4, 6, 8-12, and 14 are likewise are patentable under 35 U.S.C. § 103 in view of the cited references.

Applicant respectfully submits the rejections under 35 U.S.C. § 103 have been overcome.

Conclusion

In view of the arguments presented above, applicants respectfully submit the applicable rejections and objections have been overcome and that claims 1-16 as amended should be found to be in condition for allowance.

If there are any issues that can be resolved by telephone conference, the Examiner is respectfully requested to contact the undersigned at **(512) 306-9470**.

Respectfully submitted,

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